

WHAT IS CLAIMED IS

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1. A wavelength multiplexing method
wherein a plurality of optical signals, each being
assigned a unique wavelength, are input to and
10 output from a plurality of variable optical
attenuators, respectively, wavelength-multiplexed by
a multiplexer, and output from said multiplexer;
said wavelength-multiplexed output is spectrum-
analyzed by an optical monitor unit, and a spectrum-
15 analyzed level of each of said optical signals is
measured; and an input level of each of said optical
signals input from said respective variable optical
attenuator to said multiplexer is adjusted by said
respective variable optical attenuator such that the
20 spectrum-analyzed levels of all said optical signals
become the same, the method comprising the steps of:
detecting said input level of each of said
optical signals from said respective variable
optical attenuator to said multiplexer, and
25 controlling an attenuation amount of each
of said variable optical attenuators based on a
difference between said input level of said
respective optical signal from said variable optical
attenuator to said multiplexer and said spectrum-
30 analyzed level measured by said optical monitor unit.

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2. A wavelength multiplexing apparatus
wherein a plurality of optical signals, each being
assigned a unique wavelength, are input to and

output from a plurality of variable optical attenuators, respectively, wavelength-multiplexed by a multiplexer, and output from said multiplexer; said wavelength-multiplexed output is spectrum-analyzed by an optical monitor unit, and a spectrum-analyzed level of each of said optical signals is measured; and an input level of each of said optical signals input from said respective variable optical attenuator to said multiplexer is adjusted by said respective variable optical attenuator such that the spectrum-analyzed levels of all said optical signals become the same, comprising:

input optical level detecting means for detecting said input level of each of said optical signals from said respective variable optical attenuator to said multiplexer, and

attenuation amount controlling means for controlling an attenuation amount of each of said variable optical attenuators based on a difference between said input level of said respective optical signal from said variable optical attenuator to said multiplexer and said spectrum-analyzed level measured by said optical monitor unit.

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3. The wavelength multiplexing apparatus as claimed in claim 2, further comprising:

alarm detecting means for detecting an alarm when said input level detected by said input optical level detecting means is determined to be lower than a predetermined threshold level, and

threshold level controlling means for adjusting said threshold level of said alarm detecting means based on whether each of said optical signals is input from a stable optical

source.

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4. The wavelength multiplexing apparatus
as claimed in claim 2, wherein each of said variable
optical attenuators is configured by two or more
variable optical attenuators that are cascaded.

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5. The wavelength multiplexing apparatus
15 as claimed in claim 2, wherein said attenuation
amount controlling means control the attenuation
amount of each of said variable optical attenuators
such that a prevailing attenuation amount is changed
by an amount that is smaller than a difference
20 between said spectrum-analyzed level and said input
level from said variable optical attenuator.

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6. The wavelength multiplexing apparatus
as claimed in claim 5, wherein said attenuation
amount controlling means change said attenuation
amount of each of said variable optical attenuators
30 in steps based on the difference between the
spectrum-analyzed level and the input level from the
variable optical attenuator.

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7. The wavelength multiplexing apparatus

as claimed in claim 5, wherein said attenuation
amount controlling means set up a maximum amount of
change of the attenuation amount of the variable
optical attenuator where the difference between the
5 spectrum-analyzed level and the input level from the
variable optical attenuator is greater than a
predetermined value.

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8. The wavelength multiplexing apparatus
as claimed in claim 5, wherein said attenuation
amount controlling means change the attenuation
15 amount according to a curve, a tangent of the curve
being gradually decreased with respect to an
increase of the difference between the spectrum-
analyzed level and the input level from the variable
optical attenuator.

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9. The wavelength multiplexing apparatus
25 as claimed in claim 2, wherein said attenuation
amount controlling means suspend controlling of the
attenuation amount of the variable optical
attenuator when level change of the input optical
signal exceeds a dynamic range of the variable
30 optical attenuator.

35 10. The wavelength multiplexing apparatus
as claimed in claim 3, wherein said threshold level
controlling means adjust said threshold level of

said alarm detecting means based on information relative to an amplified spontaneous emission power level, the information being provided by an upstream wavelength multiplexing apparatus.

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11. The wavelength multiplexing apparatus
10 as claimed in claim 3, further comprising input
level calculating means for calculating the input
level to each of said variable optical attenuators
based on the output level of said respective
variable optical attenuator of the optical signal
15 detected by said optical level detecting means,
wherein said alarm detecting means perform alarm
detection when the input level calculated by said
input level calculating means is less than said
threshold value.

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